

PATENT
90065.99R272 (17732.6323)
Response Under 37 CFR 1.111

IN THE CLAIMS

1. *(Previously presented)* A power semiconductor device comprising:
a semiconductor substrate with two surfaces, an N+ doped layer extending into the substrate from one surface thereof, an N- doped layer over the N+ doped layer, a P- doped well formed in the N- doped layer and extending from the other surface of the substrate into the N- doped layer, a P+ doped region formed in the P- doped well and extending from the other surface of the substrate into the P-doped well, an N+ doped region formed in the other surface of the substrate and in the N- doped layer, said N+ region laterally spaced from the P+ doped region and the P- doped well, said P- doped well and P+ doped region having a combined thickness of about 5 μ m to about 12 μ m; and
recombination centers comprising noble metal impurities disposed substantially in said N - doped layer and P - doped well.
2. *(Previously Presented)* The device of claim 1 wherein said P - doped well has a thickness of about 4 μ m to about 10 μ m.
3. *(Previously Presented)* The device of claim 1 wherein said P+ doped region has a thickness of about 0.1 μ m to about 2 μ m.
4. *(Previously Presented)* The device of claim 1 wherein said P - doped well has a dopant level of at least 10^{16} atoms/cm³.
5. *(Previously Presented)* The device of claim 4 wherein said P - doped well has a dopant level of about 2.5×10^{17} atoms/cm³.
6. *(Previously Presented)* The device of claim 1 wherein said P+ doped region has a dopant level of at least 10^{18} atoms/cm³.

PATENT
90065.99R272 (17732.6323)
Response Under 37 CFR 1.111

7. (*Previously Presented*) The device of claim 6 wherein said P+ doped region has a dopant level of about 6×10^{19} atoms/cm³.

8. (*Previously Presented*) The device of claim 1 wherein said N - doped layer has a dopant level of about 10^{14} atoms/cm³ to about 10^{15} atoms/cm³.

9. (*Cancelled*).

10. (*Original*) The device of claim 1 wherein said noble metal impurities are selected from the group consisting of gold, platinum, and palladium.

11. (*Original*) The device of claim 10 wherein said noble metal impurities comprise platinum.

12. (*Previously Presented*) The device of claim 11 wherein said recombination centers are formed by platinum diffusion through said N + doped substrate into said N - doped and P - doped well.

13. (*Original*) The device of claim 11 containing platinum impurities at a concentration of about 1×10^{15} to about 1×10^{16} atoms/cm³.

14. (*Original*) The device of claim 13 wherein said concentration of platinum impurities is about 2×10^{15} atoms/cm³.

15. (*Original*) The device of claim 1 further comprising an N + doped region disposed in said N - doped layer.

16. (*Cancelled*).

17. (*Previously Presented*) The device of claim 16 comprising a diode, MOSFET or an IGBT power device.

PATENT
90065.99R272 (17732.6323)
Response Under 37 CFR 1.111

18. - 34. Cancelled

35. (*Currently amended*) A power semiconductor device comprising:
a semiconductor substrate with two surfaces, an N+ doped layer extending
into the substrate from one surface thereof, an N- doped layer over the N+ doped
layer, a P- doped well formed in the N- doped layer and extending from the other
surface of the substrate into the N- doped layer, said P-layer having a first thickness
and forming a first boundary with the N- doped layer, a P+ doped region formed in
the P- doped well and extending from the other surface of the substrate into the P-
doped well to have a second thickness and to form a second boundary between the
P+ doped region and the P- doped well, an N+ doped region formed in the other
surface of the substrate, said N+ doped region having a third thickness and forming
a third boundary between the N+ doped region and the P-well or the N-doped layer,
wherein the P+ doped region is vertically thinner than the P- doped well and
vertically thinner than the N+ doped region , and
recombination centers comprising noble metal impurities disposed in
said N- doped layer and said P - doped well.

36. (*Previously presented*) The device of claim 35 wherein the second
boundary is more shallow than the first or third boundaries.

37. (*Previously presented*) The device of claim 35 wherein the ratio of
thickness of the P+ doped region to the P-doped well is between 1:40 and 1:5.

38. (*Previously presented*) The device of claim 37 wherein the P+
doped region is between 0.1 to 2.0 μ m thick and the P-doped well is between
4.0 and 10.0 μ m thick.

39. (*Previously presented*) The device of claim 35 wherein the N+
doped region is separated from the P-doped well by the N-doped layer.

PATENT
90065.99R272 (17732.6323)
Response Under 37 CFR 1.111

40. (*Previously presented*) The device of claim 35 wherein the N+ doped region is within the P-doped well.

41. (*Previously presented*) The device of claim 40 wherein the N+ doped region abuts the P+ doped region.